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PRESSURE-COOKER GAUGE CHECKING PROGRAMS
CARRIED BY STATE EXTENSION SERVICES IN 1943
WITH SUGGESTIONS FOR 1944

Reserve

Summarized From a Questionnaire
by Miriam Birdseye, Extension Nutritionist

In 1937-38, a home pressure-cooker gauge checking survey made by the Nutrition Section of the Extension Division of the American Home Economics Association brought to general attention the fact that such gauges readily get out of order through careless handling, and that periodic checking and sometimes pointer adjustment or replacement are necessary if these gauges are to be relied upon to maintain temperatures within the cooker corresponding to the dial reading.

As a result of this study, State and county extension workers began to encourage pressure-cooker owners, most of whom were members of home demonstration clubs, to bring their cookers to extension meetings or to pressure-cooker clinics to be examined and to have the gauges tested before the spring canning season began, or else to send their gauges to a laboratory where they could be tested and serviced if necessary. This movement has been growing rapidly and even before 1943 had become an important part of the food preservation program in many States.

To get a picture of the pressure gauge checking program as conducted by extension workers in 1943, and to learn what kind of checking devices were favored and how many new ones would be needed to do a thorough job in preparation for the 1944 home canning season, State foods and nutrition specialists were asked to describe the nature and extent of the checking program carried in 1943, and to indicate the kind and number of checking devices they would need, to carry on the kind of program they anticipated for 1944. The following information is summarized from replies received from 37 States.

GAUGE CHECKING PROGRAMS CARRIED IN 1943

1. Sixteen States carried on extensive programs in pressure gauge testing in 1943. Eleven States carried on systematic but smaller programs. Wisconsin urged owners to mail gauges to a local pressure-cooker company which has a gauge laboratory. The rest were scattering. The estimated number of cookers checked in 1943 totaled more than 70,000.

States indicating that 1,000 or more gauges had been checked were:

Texas	20,000 (est.)	New York	3,720 (est.)
California	10,000 (est.)	Nevada	2,942
Utah	4,075	Minnesota	1,300
Idaho	3,500	Kansas	1,000-2,000 (est.)
Arizona	1,000+		

2. The devices most frequently used in testing were:

- a. A special armored maximum mercury thermometer, with a temperature range of 200° to 290°F., graduated in 1-degree divisions, made by the Taylor Instrument Companies of Rochester, N. Y. The thermometer is suspended within the cooker, the air is exhausted for 7 minutes, and the highest reading on the thermometer is compared with the highest gauge reading maintained for a period of 3 minutes. This test is a delicate one, subject to error in reading the finely divided thermometer, and also through failure to exhaust the air in the cooker completely. Properly carried out, the test consumes 40 to 60 minutes per gauge.
 - b. A master gauge assembly consisting of a T-shaped fitting that screws into an opening in the cooker made by removing the safety valve, or by special boring. The assembly has an arm fitted to mount from one to five test gauges. This test requires exhausting the cooker and consumes from 10-15 minutes for one or more gauges. One State has substituted air pressure from a hand pump for steam pressure in its master gauge assembly.
 - c. A retort thermometer assembly like the master gauge assembly described in 3-b takes 15 to 20 minutes per test.
 - d. A commercial gauge tester consisting of a sturdy geared or movement gauge of about the same size as the gauge to be tested. This master gauge is mounted at the end of a heavy slotted metal tube closed at both ends in which air pressure is developed by screwing a plunger against a small column of water or oil. The gauge to be checked is screwed into this tube. Prewar price, \$6. With this device a gauge can be checked in 5 to 10 minutes.
 - e. In the above tests, thermometers and master gauges, including the commercial gauge tester, were routinely checked at intervals at the institution against a dead-weight tester, mercury manometer, or large master gauge.
 - f. One State checked a number of gauges in the field, using a mercury monometer with air pressure. This device is described and illustrated in Bureau of Home Economics' mimeograph, "Methods of Checking Pressure Canner Gauges."
3. In order to standardize techniques within the State, county home demonstration agents and, in a few States, agricultural agents were given careful training in checking cookers, often through regional training schools. This was done by extension specialists in food preservation, nutrition, home management, or engineering, or by engineering staff members. For several years prior to the war a pressure-cooker manufacturer as a service feature held county pressure-cooker clinics scheduled by State extension services, and thus a number of agents received training in checking cookers, gauges, and can sealers.
4. The replies make it clear that home demonstration agents have used the test as an opportunity to discuss with the owner the proper use and care of the cooker and its attachments and to show how to correct sea-level gauge readings for local altitudes.

5. In most States service rendered by the agent was limited to:
- a. Tagging the cooker to indicate the adjusted reading necessary to obtain the desired canning temperatures of 240° and 250°F. in case the gauge was found to register not more than 3 to 5 Pounds high or low.
 - b. In case of wider variations, advising the owner to send the gauge to the pressure-cooker manufacturer for checking, or to replace the defective gauge with a new one.
 - c. Apparently a number of agents have been taught by representatives of the Burpee Can Sealer Co. to remove and reset the pointer, in cases where the gauge reading shows the same deviation at 10 pounds pressure as it does at 15 pounds.
 - d. Several States were fortunate in having the assistance of the extension engineer in holding pressure-cooker "clinics" in counties. Many gauges are adjusted at such schools.
6. In several States checking was done primarily at the institution by extension engineers or other specialists, or by heads of physics or engineering departments. In Minnesota it was done in the laboratory of the State bacteriologist. In such cases tests were quickly made with dead-weight testers, compressed air with regulating valves, or an air manifold with master gauge which was checked regularly on a dead-weight tester. Repairs were made when possible, and a statement was provided showing adjustments made or adjusted gauge readings necessary to maintain standard canning temperatures.

Types and causes of gauge deviations observed.

Engineers who have conducted pressure-cooker clinics or checked gauges at the institution have reported as frequent causes of faulty registering: Dropping or striking the cover, which may displace the pointer; placing cover in soapy water, which gets into the gauge mechanism; damage to the slender, curved Bourdon tube which straightens out under increasing steam pressure and moves the pointer around the scale. Some tubes which are not sturdy and properly shaped have collapsed when the closed cooker has been allowed to develop a severe vacuum. A few tubes leak steam from overpressure. In addition, petcock and safety valve often become stuck together with scum from greasy steam and food particles sucked from the jars.

The assistant professor of engineering at Michigan State College in 1943 reported that out of 611 gauges sent in for testing, "30 percent were correct, 40 percent read 2 to 5 pounds above actual pressure, and among the other 30 percent some read up to 10 pounds above actual pressure; some leaked steam; several were stopped up so they could not function and several were very sluggish because of foreign matter in the gears or because the hand was restricted in its movement." Report from other States confirm Michigan's experience.

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STATES ASK FOR CHECKING EQUIPMENT FOR EXPANDED PROGRAM IN 1944.

Since a pressure cooker is not a precision instrument unless its gauge registers accurately, or unless small deviations are known and allowed for, success in the 1944 canning program would seem to call for a census and check of all cookers. The replies indicate a desire to undertake this tremendous task if checking devices can be made available which will give accurate results with a minimum of time. Because of the great demand for gauges for use in airplanes, warships, and mechanized equipment, it has been difficult for State workers to obtain geared gauges for checking purposes, the manufacture of commercial gauge testers has been discontinued, and maximum thermometers have been obtainable only on very high priorities and in small numbers, if at all.

1. Commercial gauge tester favored as a checking device.

Several extension engineers and Mr. Arnold Baragar of the Home Economics Experimental Laboratory at the University of Nebraska having reported favorably on their experience with the Burpee gauge tester, and said that when properly packed it could be carried in a car or even shipped by mail without undue jarring of the pointer; and since the accuracy of such a gauge tester can be checked periodically against precision instruments at the institution, and individual gauges can be checked with this device in 10 minutes or less, extension specialists were asked: Would you favor using commercial gauge testers in 1944, if these can be obtained?

All but 5 of the 37 States indicated that they would favor using such a device, if it was shown to give dependable service. Three States, Arizona, Nevada, and Utah, preferred the maximum thermometer to other devices, and many States wanted some maximum thermometers as well as gauge testers. Kansas asked for retort thermometers to increase its limited supply of thermometer assemblies that have given excellent results, and Nebraska asked for a certain make of geared gauge that had given excellent results in its master gauge assembly. The New Jersey extension engineer felt that a central gauge checking service at the college would be more satisfactory than clinics in the counties. Some States reported that if gauge testers became available very early, one tester could be used to check cookers in several counties. Other States said they would need 1 or more gauge testers per county. The aggregate number suggested was around 1,000, which appears to be a minimum estimate, in view of the 3,500 agricultural counties, and the large number of cookers owned by city families.

2. Gauge checking devices needed early.

All States emphasized the need for obtaining the checking devices early. Of the 31 States giving definite dates, 7 asked for them for immediate use in December during the winter meat-canning season; 7 in January; 2 in February; 10 in March; 1 in April; and 4 in May.

3. Pressure gauge checking service in cities by public service company employees favored for 1944 program.

Most of the respondents felt that such service would be desirable provided employees were properly trained and used reliable checking devices. It was felt that such employees, or selected equipment dealers, could develop the skill and stock the spare parts needed to do a satisfactory job of adjustment and repair.

4. Excerpts from proposed plans for 1944 gauge checking program.

A variety of excellent suggestions was given for improving and extending the program in 1944. It is regretted that space does not permit quoting in full the plans from the respective States. The suggestions excerpted below, taken in sequence, appear to cover the main points in a comprehensive State program.

"We need a list of services that can be obtained from pressure-cooker companies for adjusting gauges and other repairs. A few gauge testers would enable us to take care of county needs for checking."-West Virginia.

"We have a record of practically every pressure-cooker owner in the State, including all cookers purchased in 1943. Regularly scheduled extension service clinics will be held in counties. Dial gauges may also be mailed to State office, where they are checked with mercury manometer, and repaired when feasible. Burpee two-piece metallic gauge can also be checked with manometer."-Arizona.

"A special testing program should be conducted very early in the year before the canning season begins. For efficient work, we need a gauge tester for each of the home demonstration agents, emergency food commission agents and 4-H homemaking agents, also our State specialists and regional agents, and some for the State office. One hundred and twenty-two gauge testers needed in March. We need instructions as to the different types of inaccuracies that need to be and can be corrected."-New York.

"We would like to see each agent own her own gauge tester provided gauges could be checked at intervals."-Virginia.

"Having conducted State-wide training schools in 1943, this coming spring home-management specialist will train all new extension agents to do gauge testing using the Marsh gauge in a coupling screwed into the cooker cover. Agents' test gauges will be checked several times a year at the college laboratories. More gauges are needed for testing purposes."-Nebraska.

"New agents should be trained to check cookers and test gauges before going into counties."-Kansas.

"Have resident agricultural engineer hold two canning equipment meetings per county beginning in June and train personnel of interested agencies to test pressure gauges with the Burpee gauge tester, and to adjust gauges."-Maine.

"We have only 11 HDA counties. We feel we need a man to assist in a comprehensive gauge testing program, which should be carried through the winter months. Reliable gauge testers made by a recommended company are needed."-North Dakota.

"Leaders trained by HDA's in 1943 will continue to test gauges, and we hope to continue training leaders in non-HDA counties, where some agricultural agents learned to test and service gauges last year. Gauges will be adjusted if possible if more than 5 pounds off, tagged for smaller deviations. We could use approximately 100 maximum thermometers by February or March."-Utah.

"What we need more than anything else is a satisfactory way of adjusting gauges if we find them wrong."-Florida.

"We have found it extremely difficult to repair faulty gauges and we hesitate to assume this responsibility for privately owned cookers."-Vermont.

"It is not advisable for agents to continue to test cookers in 1944, or for owners to expect to receive this service free. The plan is to locate in each community a commercial firm or some individual who can and will do this testing and correction at a reasonable cost; or to have leaders trained to test cooker gauges who will do so for a fixed sum."-California.

"The manufacturers should offer reliable testing service through their dealers."-New Hampshire.

"We have discussed the possibility of having the checking of gauges done by our agents and a more complete service offered by the hardware dealers. People engaged in sales and service work would be in a better position to do adjusting and repairing, and to replace missing or damaged parts. The State college would limit its service to testing master gauges used for checking other gauges. If a comprehensive plan for community testing could be arranged, we would be glad to test one master gauge for each community. We believe hardware dealers should provide this service for city homemakers."-Michigan Engineering Department.

"Centrally located canning centers could serve many city women, so that fewer cookers and less testing would be needed."-Florida.

"In 1943, home-management specialist trained public-service men in half the counties, and they accounted for nearly half of the 4,500 tested in the State-wide program. She will train public-service men in remaining counties in 1944. Agents will continue to test cookers at meetings early in 1944. Agents will continue this service with the objective of having adjustments and repairs made locally. Device used, a master gauge on an arm which provides places for 5 gauges to screw into safety valve, but pressure is now usually supplied by a bicycle or other hand pump instead of by steam. Time required per gauge, 3-5 minutes."-Washington.